

# Ku/Ka-Band Electrically-Scanned Line Array for Tri-Band Cloud and Precipitation Radar Applications, Phase I

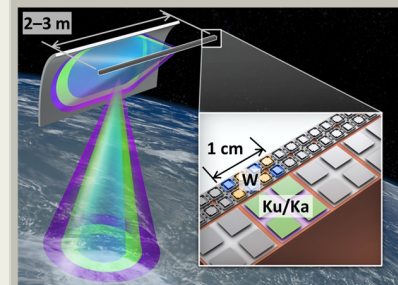
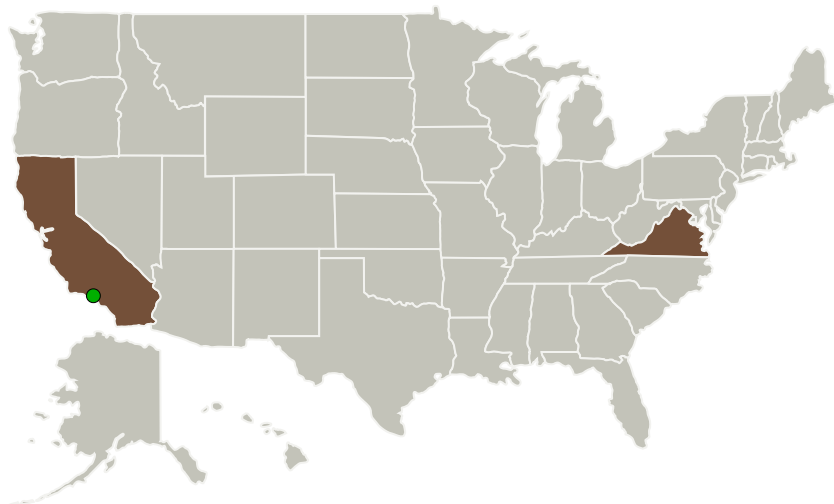
Completed Technology Project (2014 - 2014)



## Project Introduction

A spaceborne radar system that operates simultaneously at multiple frequency bands from microwave through millimeter-wave frequencies can exploit the largely varying frequency response of electromagnetic radiation to various atmospheric conditions, thus forming a highly-capable remote sensing system for NASA earth science objectives such as cloud and precipitation monitoring. We propose the development of an electrically scanned, co-located Ku/Ka-band (13.4/35.6 GHz) linear array in the Nuvotronics PolyStrata® technology for integration with an electrically scanned W-band (94 GHz) linear array to form the feed for a three-band remote sensing system. The PolyStrata® wafer-scale microfabrication process, with the capability to monolithically integrate dielectric-free antenna arrays with ultra-low-loss air-coax feed networks in three-dimensions, will be a key enabler of achieving the state-of-the-art performance requirements for front-end losses at the desired operating frequencies as well as the desired scalability to 2-3 meters. Unprecedented transmit efficiencies and power levels will be achieved by leveraging Nuvotronics' history of developing Gallium Nitride (GaN) power amplifiers and low-loss switches at similar frequencies. A prototype hardware demonstration of the co-located Ku/Ka-band antenna array fabricated in the PolyStrata® process will be provided.

## Primary U.S. Work Locations and Key Partners



Ku/Ka-band electrically-scanned line array for tri-band cloud and precipitation radar applications  
Project Image

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Organizations Performing Work	Role	Type	Location
Nuvotronics, Inc	Lead Organization	Industry	Radford, Virginia
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

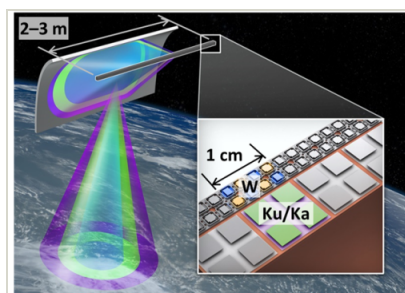
California	Virginia
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## Project Transitions

**June 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140587>)

## Images

**Project Image**

Ku/Ka-band electrically-scanned line array for tri-band cloud and precipitation radar applications

Project Image

(<https://techport.nasa.gov/image/134819>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Nuvotronics, Inc

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Benjamin Cannon

**Co-Investigator:**

Benjamin W Cannon

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## Technology Maturity (TRL)

Start: **2**  
Current: **3**  
Estimated End: **3**



## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.1 Avionics Component Technologies
    - └ TX02.1.6 Radiation Hardened ASIC Technologies

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System